Remarks

The Office Action mailed January 8, 2009 has been received and reviewed. Claims 15-20, 22-27, 29, 33, and 34 having been amended, claims 1-14, 21, and 31-32 having been canceled, without prejudice, the pending claims are claims 15-20, 22-30, 33, and 34. Reconsideration and withdrawal of the rejections are respectfully requested.

Claims 15-20, 22-26, 33, and 34 have been amended in their dependency and to recite a dental ceramic framework. Accordingly, rejoinder of these claims is requested as they now are appropriately a part of the previously elected Group III claims (an article of manufacture).

The 35 U.S.C. §102 Rejection

The Examiner rejected claim 29 under 35 U.S.C. §102 as being anticipated by Garcia et al. (U.S. Patent No. 6,464,765). Claim 29 having been amended to recite a dental ceramic framework and the use of a colouring solution, this rejection is rendered moot. Support for this is in Applicants' Specification, for example, at page 3, lines 17-19, which refers to a dental technician and a dental product (LAVA Frame of 3M ESPE AG), and, for example, at page 6, lines 18-21, which refers to a colouring solution.

Garcia et al. disclose a slurry containing solid particles in the slurry, whereas the present invention is made using a solution, wherein the metal salt or metal complex is soluble in the solvent. Furthermore, the amount of the metal ions in the composition is in the range of 0.01 to 7.0% by weight. Garcia et al. fail to disclose a solution containing a comparably low amount of metal ions. In contrast, Garcia et al. teach a slurry containing 50 to 90 parts by weight solid particles (see, for example, column 3, lines 12 to 15).

If a (porous) ceramic framework is treated with a solution, the solution will migrate into and colour the entire framework, especially for small dental pieces. This is in contrast to the slurry used by Garcia et al. The slurry (containing a huge amount of insoluble pigments) will not colour the entire framework. The insoluble pigments will remain on the surface (which is also the intention of Garcia - see, for example, column 1, lines 20-23, lines 28-30; lines

38-43). Adding non-soluble pigments to the inventive colouring solution would be contraproductive. The result would be an inhomogenous coloured surface typically needed for decorative work but not desired in the dental field.

There is no teaching or suggestion of a dental ceramic framework in Garcia et al. Also, Garcia et al. use a slurry that includes solid particles. Thus, Garcia et al. do not show exactly what is claimed, as required for an appropriate rejection under 35 U.S.C. §102. Accordingly, withdrawal of this rejection is requested.

The 35 U.S.C. §103 Rejections

The Examiner rejected claims 27 and 30 under 35 U.S.C. §103 as being unpatentable over Garcia et al. (U.S. Patent No. 6,464,765) and further in view of Williams et al. (U.S. Patent No. 6,786,994). The Examiner rejected claim 28 under 35 U.S.C. §103 as being unpatentable over Garcia et al. (U.S. Patent No. 6,464,765) and further in view of Williams et al. (U.S. Patent No. 6,786,994) and further in view of Shrewellus (U.S. Patent No. 3,027,331). These rejections are respectfully traversed.

Garcia et al. disclose a slurry containing solid particles in the slurry, whereas the present invention relates to a dental ceramic framework treated with a solution, wherein the metal salt or metal complex is soluble in the solvent. Furthermore, the amount of the metal ions in the solution is in the range of 0.01 to 7.0% by weight. As mentioned above, if a (porous) ceramic framework is treated with a solution, the solution will migrate into and colour the entire framework, especially for small dental pieces. This is in contrast to the slurry used by Garcia et al. The slurry (containing a huge amount of insoluble pigments) will not colour the entire framewor

Furthermore, Garcia et al., at best, suggests adding PEG 200 (Table 1) to increase the viscosity of the aqueous composition, and as a humectant (column 3, lines 51-58). The solution used in the present invention contains PEG having a Mn in the range of 10,000 to 50,000. The Examiner uses Williams et al. to teach PEG with a molecular weight of 100 to 40,000.

Using the solution according to the present invention, a uniformly coloured ceramic dental framework can be obtained showing less sintering deformation after firing. Thus,

the objective problem to be solved can be considered as of providing a shelf-life stable solution which can effectively penetrate a ceramic framework without detrimentally affecting the deformation during firing.

To achieve this object, the solution has to be balanced in respect of viscosity and content of metal ions. As stated in Applicants' specification at page 7, lines 19-20, it is important that the solution used has "an adequate viscosity so that sufficient wetting of, and penetration into, the pores of the ceramic framework can be achieved." The slurry suggested by Garcia et al., even if modified by the PEG of Williams et al., is not suitable, as it contains a huge amount of solid particles. This solution cannot penetrate the ceramic framework, as discussed above.

Although Applicants have shown the importance of the presence of PEG in the solution and the impact on the final product, the Examiner has asked for a comparison of results showing the impact on the product of different molecular weights of PEG. Thus, Applicants have conducted further experiments using varying molecular weights of PEG, the results of which are described in the accompanying Declaration of Holger Hauptman.

Therein, it is shown that the molecular weight affects the viscosity of the colouring solution and thus its ability to migrate into the pores of the ceramic framework. The use of PEG having a molecular weight outside the claimed range will lead to an inhomogeneous colouring of the ceramic framework.

Specifically, in the Declaration, it is shown that a solution comprising PEG having a Mn in the range of 10,000 to 50,000 in an amount of 2 to 8 % by weight has a viscosity below 30 mPas. Such a solution is useful to achieve the desired objective of "sufficient wetting of, and penetration into, the pores of the ceramic framework."

However, when it comes to penetration into a ceramic material, each and every solution of PEG is not useful. Test bars (LAVA Frame) were soaked with solutions containing different amounts and concentrations of PEG (6 % PEG 35,000; 0.2 % PEG 1,000,000, 2 % PEG 300,000; 1 % PEG 35,000, 1 % PEG 100,000, 1 % PEG 300,000). The penetration of these solutions into the test bars was examined (see Comparative Tests, Exhibit A, enclosed). The test

results show that not each and every solution, showing a range of PEG molecular weights, is useful to achieve the objective of the present invention.

Thus, even if it is assumed that the PEG is driven off by firing, the resultant product will be affected by the use of the PEG, its molecular weight, and its amount.

It is respectfully submitted that there is no motivation to alter the amounts of a couple of ingredients and the molecular weight of one of the ingredients of the slurry of Garcia et al. to arrive at the solution of the present invention. The inventive solution is not suitable for decorating a ceramic substrate in the sense of Garcia et al. (see, for example, column 1, lines 6 to 8 and lines 63 to 67), as it does not contain solid particles. The Examiner is requested to note that the slurry to which Garcia et al. refers contains from about 50 to about 90 parts by weight of solid particles (column 3, lines 10-15).

That is, there is no motivation for a person skilled in the art to modify the slurry of Garcia et al. (containing insoluble pigments used for decorating the surface of ceramic framework) by removing the insoluble pigments and arriving at a homogeneous solution (and thus making the composition useless for doing decorative work - on the surface of the ceramic). This is clearly based on hindsight.

Furthermore, the Examiner's attention is also drawn to column 3, lines 21 to 32 of Garcia et al. In this paragraph a couple of methods are disclosed for adjusting the viscosity of a solution. It is mentioned that the addition of PEG generally increases the viscosity of an aqueous saturated solution. Thus, a skilled person seeking a solution which can easily penetrate into a ceramic framework would not consider to add PEG to such a solution and/or to increase its molecular weight from that of PEG200. Using a PEG with a higher molecular weight would typically increase viscosity, thereby it would be expected to decrease penetration.

Also, a solution of the present invention can be more easily applied, e.g., by spraying or dipping, which is in contrast to the teaching of Garcia et al. Garcia et al. state at column 5, lines 57-59 that "[p]rior to the present invention, the only way high intensity color could be obtained on ceramic substrates using solutions of metal salts, if the metal salts were sprayed on. The technique of spraying solutions . . . is not advantageous." Thus, Garcia et al.

clearly teach away from using a colouring solution (not containing insoluble pigments), as opposed to a slurry.

Summary

It is respectfully submitted that the pending claims 15-20, 22-30, 33, and 34 are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives at the telephone number listed below if it is believed that prosecution of this application may be assisted thereby.

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